

REMARKS/ARGUMENTS

Reconsideration of this patent application is respectfully requested in view of the foregoing amendments, and the following remarks. Claims 7-12 are in the application and are new. Claims 1-6 have been canceled. No new matter has been added.

The Examiner rejected claims 1-6 under 35 U.S.C. §112 for being indefinite. Applicants have canceled claims 1-6 and have rewritten them as new claims 7-12 to further clarify the invention. Regarding original claims 2 and 5, these claims have been rewritten as new claims 8 and 11 and have specified the temperatures of the reactors. Support for this amendment can be found in the specification on page 10.

The Examiner rejected claims 1-6 under 35 U.S.C. §102(b) as being anticipated by *Fuderer U.S. Patent No. 4,553,981*. Applicants respectfully traverse. Claim 7 has been written to include the additional feature that the amount of the partial hydrogen stream is adjusted so that it meets the energy demand of the reformer during common combustion with the waste gas stream. Support for this element can be found in the specification on 8, lines 4-11.

In the method shown in Fig. 1 of *Fuderer*, carbon dioxide is removed from the converted gas stream by a gas scrubber, and the scrubbed hydrogen-rich gas stream (8) is subsequently separated into a product gas stream (19) that consists of hydrogen, and a waste gas stream (20), in an alternating pressure adsorption system PSA (9). One part (21) of the waste gas stream is passed back into a steam reformer (2), and used as a usage material for the steam reformer process, together with the feed stream (1). The method is described as follows in column 5, lines 58 to 65:

"Thus, at least a portion of methane-containing waste gas from the pressure swing adsorption system can be recycled at elevated pressure to said effluent gas generation step, ie., by passage through conduit 23 to conversion means 2. When said means 2 comprises a steam reformer or partial oxidation unit, the methane is converted to additional quantities of desired hydrogen."

In the known method, only one partial stream is fed back, which can amount to more than 40%. Another partial stream (24) is passed out of the process, in order to avoid accumulation of inert gases in the process (column 5, lines 52 to 55).

Furthermore, flash gas (12) is passed back into the steam reformer (2). The flash gas (12) is a gas stream that is formed

during separation of CO₂ from the scrubbing fluid used for the gas scrubbing process. This process step is explained in column 5, lines 10 to 16:

"while the carbon dioxide-containing absorber liquid or solvent is passed from said scrubbing means 7 through conduit 10 to flash tank 11, from which flash gas in line 12 is conveniently passed to recycle compressor 13 for return to shift conversion means 5 and/or hydrocarbon conversion means 2, if desired."

The flash gas contains components of CO₂ and no hydrogen.

The method according to the invention differs from the method of *Fuderer* by the following characteristics:

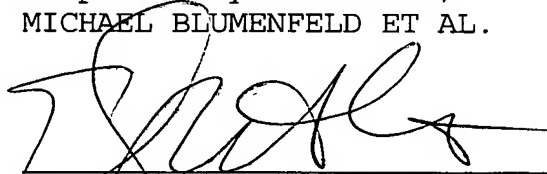
- a) All of the waste gas stream is passed to a combustion chamber of the reformer;
- b) a partial hydrogen stream is branched off from the gas stream behind the gas scrubber;
- c) the waste gas stream and the hydrogen stream are mixed and used together as a combustion gas that is extensively free of carbon and burned in the combustion chamber of the reformer; and
- d) the amount of the partial hydrogen stream is adjusted so that it covers the energy demand of the reformer during common combustion with the waste gas stream.

Because of the method according to the invention, additional firing of the reformer with fuels that contain carbon is eliminated, so that the carbon dioxide emission is clearly reduced. The method according to the invention creates a possibility of utilizing the entire waste gas stream that occurs in the alternating pressure adsorption system. Since the waste gas stream is used as a fuel gas, together with hydrogen, there is no risk that the inert gas components will accumulate as the result of recycling of the waste gas stream.

Claim 4, which is directed at a system for implementing the method, is also patentable over *Fuderer*. The system shown in Fig. 1 of *Fuderer* does not have any device for feeding part of the hydrogen-rich gas stream that leaves the gas scrubber (7) back into the reformer (2). In particular, there is no indication that part of the gas stream (8) is fed back into a combustion chamber of the reformer, and that it is utilized as a fuel gas, together with the recycled waste gas stream (21).

Accordingly, Applicants submit that new claims 7-12 are patentable over the cited references, taken either singly or in combination. Early allowance of the amended claims is respectfully requested.

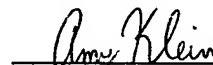
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